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A DIGEST OF CURRENT LITERATURE

ON STREET AND HIGHWAY TRAFFIC

and

NEWS OF THE INSTITUTE OF TRAFFIC ENGINEERS

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A DIGEST OF CURRENT LITERATURE

171. NIGHT-TIME HIGHWAY VISIBILITY AIDS. Arnold H. Vey, Traffic Engineer, State of New Jersey,(Rural Traffic Problems).

Increased activity has been carried on in recent years to improve and make possible long-range, daytime visibility by reconstructing roads and building new roads with flatter crowns and curves, as well as acquiring easements at street intersections to provide sufficient corner sight distance. This is especially true on rural state highway systems.

Excluding accidents involving drivers who had been drinking and drivers who had been asleep, there is little difference in the conditions involved in night-time and day-light accidents, except in those which are chargeable to inadequate vision.

The driver during darkness has less time and space to perceive the danger and, consequently, less opportunity to stop or change his course to avoid a collision. Therefore, at the moment of impact, it is probable that vehicles involved in night-time accidents are traveling at higher speeds than in the day-time, resulting in more serious accidents than those which happened during day-light. Accident facts of New Jersey as well as elsewhere substantiate this statement.

There are two general methods by which night-time visibility may be artificially provided; that is, by lights placed upon a vehicle in such a manner that the rays are directed on and along the roadway in advance of the car and by highway lighting.

During the past few years,there has been material advancement in the development and use of reflecting material for highway signs, roadway markings, line markings and curbing, all of which greatly aid night driving. Such devices not only designate changes in alignment and topography, roadway widths and the presence of unusual hazards but also provide sufficient advance discernment in order that motorists may govern their course accordingly.

It is important that all STOP--SLOW type and railroad warning signs be reflectorized or illuminated. In addition, caution signs should be reflectorized or illuminated whenever

it is advisable and important to call to the attention of drivers, the presence of extreme hazards.

During the Spring of this year, a new type of roadway marker, namely the Lucite Reflector Button, was produced for use along unlighted rural highways. Several states are now experimenting with the application of those markers spaced at intervals of approximately 100 feet apart and eight feet from the pavement edge, thereby outlining the border or edge of the roadway.

Markers of this type, however, do not illuminate the highway nor do they increase visibility distance and should not, therefore, be considered as an alternate for highway lighting except on roadways where such lighting is not deemed necessary.

This past year, the New Jersey State Highway Department has been experimenting with the use of white cement, reflector type curbing along some of the major divided roadways. This curbing is so designed that by casting in the slanting face of the curb a series of panels or ridges, the approach sides of which are substantially at right angles to the drivers vision, the headlight rays are reflected from the sides of those panels or ridges back to the driver, thus acting as a series of reflectors making the curb definitely visible.

With highway lighting, the principle of vision by silhouette is employed. The light source is placed high enough from the roadway to be out of direct line of vision of drivers and is placed over the travelable portion of the roadway, providing a continuous path of light even in times of inclement weather. It seems likely, therefore, that these principles applied to rural highways will serve in a similarly advantageous manner as along urban roadways.

172. GRAPHIC COUNTERS ANALYZE TRAFFIC BEHAVIOR. William G. Eliot, 3rd, Highway Economist, U.S. Bureau of Public Roads. (American City, July 1939)

A graphic time recorder has been used to record, through manually operated telegraph circuits, the instant of passage of every vehicle at each end of a measure section of highway. The speed and position of individual vehicles can be easily read from permanent chart records.

Differences in individual speeds cause unequal spacing and a consequent "bunching" of vehicles. This in turn, by leaving, gaps in the line, provides opportunities for overtaking and passing in the opposing lane of traffic. As the volume of traffic increases, the gaps decrease in number and in size and the pace for all is finally set by the slowest vehicle.

From an enormous number of individual vehicle data, taken at many different locations, it has been found that vehicles following each other at the same speed tend to maintain a spacing of about 1½ seconds, regardless of the speed at which the traffic is moving. This fact permits a simple calculation of the maximum capacity of a highway if we assume that all vehicles can be kept moving at uniform speed. Under normal traffic conditions, on any given highway, regardless of speed or volume, from 67 to 75 per cent of the vehicles close up to less than the average spacing for all vehicles. A further analysis of spacing reveals the frequency of gaps or different lengths, thus giving an index of the freedom to pass. At a volume of 1,100 vehicles per hour in each direction on a two lane highway, there is practically no opportunity to pass, even if sight is unlimited.

If a free flow of traffic depends on freedom to pass, then adequate sight distances must be provided to make that passing safe.

The analysis of traffic capacity shows that slow vehicles are often a controlling element in the traffic stream and have an importance out of all proportion to their numbers.

As another phase of research, The Bureau of Public Roads, in cooperation with the Highway Research Board and other agencies, has directed its attention to the causes of highway accidents. Already published is an analysis of the accident records of nearly 30,000 drivers, selected at random from the Connecticut license files, which reveals the unquestionable existence of a class of "accident-prone" individuals. Nearing completion is a study of the value of motor-vehicle driver tests as a means of identifying these dangerous drivers before they have an opportunity to demonstrate their accident making propensities publicly.

173. INSTALLATION OF SAFETY FIN AND DEATHLESS SAFETY ISLANDS.
Otto K. Jelinek, Traffic Engineer, Chicago Park Dist.

The Chicago Park District is completing the experimental construction of a new type of divisional fin on the Outer Drive at 47th Street.

It features two new types of safety islands at the north and south ends of the fin. The north island has approaches made of white concrete and is so designed that cars would be deflected from the island proper if stuck from an angle or off center, or stop the car by friction and gravity in case the island approach is straddled. The south island has approaches made of two parallel wire cables inclined from the pavement to the safety island with Federal yellow colored wood boards between these cables. Cars whose drivers are

asleep or have their attention diverted would, upon driving on the device, cause the cables to sag, thereby further-causing the wood boards to clack upon the pavement, which would give a sound warning to the drivers of their approaching danger.

Stretching between the above described islands and two turn-off islands at 47th Street extended are six separate strands of yielding cable, so arranged it acts as a positive divisional fin without the dangers of fixed types of curbs, used on ordinary divisional fins. Cars striking this new type of fin would be deflected back into its proper channel by the yielding cable and would not jump the curb, as is the custom on ordinary fins, which frequently cause drivers to lose control of their cars.

174. SPECIAL HAZARD WARNING SIGNS. Rufus G. Jasper, Traffic Engineer, National Safety Council. (Rural Traffic Problems).

Standard signs have been developed for warning motorists of their approach to the more common types of hazards. Occasionally, however, engineers are confronted with a traffic hazard that is different or unusual, one that has certain factors connected with it that requires special handling. None of the standard signs quite apply. In many such cases it is necessary to design a special sign.

There are a few definite steps that I would like to offer:

1. Find out exactly what the hazard is.

2. Design a sign that will convey to the motorist a message accurately describing the hazard that is ahead of him, or one that tells the motorist exactly what to do.

3. Erect the warning sign at such a point that the motorist will see it easily and will then have ample time to take whatever action is necessary to keep his vehicle under control and avois any possibility of an accident.

175. A COMMENT ON BIOLOGICALLY CORRECT TRAFFIC EQUIPMENT. T. W. Forbes. (Journal of the American Medical Association, March 4, 1938).

A previous note in the same journal by Fabing stressed the need for biologically, physiologically and psychologically sound traffic techniques, and rightly so. Unfortunately, It went on to recomment the clock type of traffic signal, a type

which has been tried out and discarded due to certain difficulties. One of these is a matter of practical driver psychology; i.e., both starting and stopping, drivers are shown the amount of time remaining before the change of signal, and both tend "to crash the yellow" with attendent collisions. This has been taken care of in the Standard Manual by elimination of the starting yellow.

Furthermore, the author contended on the basis of certain "conditioned neurosis" experiments with dogs, that the three color standard traffic signal is hard on the nervous system. This was backed up by his own observations of increased heart beat, sweating and similar autonomic nervous symptoms. It is pointed out, however, that the approach of a pretty girl, lack of experience in handling a car and other factors produce similar results. Color blindness might cause difficulty in distinguishing the color of the signal but this would be obviated by noting the position of the lenses since the stanard code places the red signal always on the top.

Certainly the nervous reaction noted cannot be explained on the basis of Pavlov's "conditioned neurosis" unless some special condition such as color blindness is present. The neurosis was produced in animals only when the signals became so similar that the dogs were unable to distinguish them and certainly the average motorist has no difficulty in distinguishing the red and green signals.

Although color blindness is found in a relative small per cent of the population, it is possible that lenses could be improved for the benefit of the red-green blind person, but otherwise the standard signals seem generally well adapted.

On the other hand, the contention is sound that traffic facilities and control devices should be fitted physiologically and psychologically to the driver and should apply to the design of signs, highway lighting,sight distances and all other phases of traffic. Strides are being made in this dir-- ection.

176. THE TRAFFIC ENGINEER AND THE HIGHWAY. T.Elmer Transeau. Assistant Director, Dept. cf Safety, Philadelphia (Safety, July 1939)

What percentage of the fatal accidents included in published tables due to driving off the roadway, cutting in, driving on the wrong side of the road, and similar practices, are at least in part brought about by highways of insufficient width for the amount of traffic they carry, curves too sharp to be safely driven at today's speeds, shoulders that have been allowed to fall into disrepair, and general inadequacy. "Driver Mistakes" list approximately one fatal accident out of four

as having occurred from the three causes: driving on the wrong side of the road, cutting in, and driving off the roadway.

The thing that is outstanding is the lack of uniformity among the different States in handling such matters as the width of paved roadway, the maintenance of the shoulders,-proper signs and markings, and provision for passing in congested areas, to mention a few of the outstanding hazards of the cross-country driver.

The following constructive recommendations:

1. More study along the lines of the Highway Planning Surveys in connection with the real needs of highway users; the character and ability to carry traffic over new or improved highways should be based on fact-finding studies and not personal opinions or political purposes.

2. There should be more by-passing of small cities --for various reasons some cities have opposed the construction and arranging of by-passes-- this is a false position. Trunk highways should skirt all important cities or towns,and properly marked alternate routes be arranged or constructed so as to permit those who wish to enter such towns.

3. There should be more progressive and less hidebound view of the necessary widths on important highways. In many cases three lane highways, (in themselves open to considerable question as to safety),will be found for some distance outside of important cities giving way finally to a two-lane road.

4. Funds expended for unusually wide stretches of pavement, except where future improvements are contemplated, as in cases of grade crossing elimination and highways which are to be widened, are to be condemned.

5. The adoption of a uniform lane width on national highways of not less than ten or even twelve feet,in consideration of today's speeds and the widths of trucks and buses.

6. Periodic and systematic maintenance of shoulders along such highways.

7. The practice of center lining varies immensely-in different States; and should be uniform.

177. DRIVER JUDGMENTS IN PASSING ON THE HIGHWAY. T. W. Forbes and T. M. Matson. (Journal of Psychology, 1939, vol. 8).

This is a report of certain driver reactions observed in connection with a study of overtaking and passing on the highway. Observations were taken from a "Floating" vehicle with the aid of a stop watch and candid photographs which furnished measurements of distance. The overtaking driver had no indication that he was being observed other than the ordinary sight of a camera fan using a small camera. Total observations numbered 795.

It was found that unless the overtaken car was going at a speed definitely slower than that of the overtaking car, the driver of the latter tended to drop into line rather than to pass. Therefore, an analysis was made of the speed differentials of this category represented those below which the overtaking driver dropped behind and followed and thereby automatically placed his pass in the "accelerating pass" category. This analysis showed that the lowest consistent comfortable speed differential was 6.5 miles per hour; i.e., the overtaking minimum was approximately the same for both the winding highways of New England and the straighter highways of the Mid and Far West.

Most drivers were not comfortable even at this speed differential as shown by the fact that the median differential was from 8 to 11 miles per hour, a figure which corresponds fairly well with the average passing differential given by Greenshields.

An estimate was made on the basis of the recorded times and distances, of the amount of clearance allowed by the passing driver in the cases where there was an oncoming car. When expressed in terms of "Clearance Time", it was found that distributions were similar for different velocities of the overtaken car. Of the total of 156 passes involving an oncoming car, 80 per cent were executed with a clearance time of 1 second or more. Or conversely, 20 per cent of the drivers who passed in the face of oncoming traffic allowed an oncoming Clearance Time of less than 1 second.

More New England drivers passed with short time clearances than did Western drivers. This is explained as apparently due to the difference in driver attitudes since the curving New England roads with their short sight distances tend to make drivers pass in spite of possible hazard.

The accuracy with which drivers judged clearance was also analyzed from the cases in which the same driver refused a pass due to an oncoming car or hazard, and later passed successfully. The clearance refused was compared with the ac-

tual distance required by the driver in his succeeding pass, and showed that about half of the refusals were justified. This corroborates previous finding by one of the authors--that such judgments are rather inaccurate on the part of many drivers.

It is suggested that 1 second clearance time should be added to the perception-reaction time already in use for the computation of safe passing sight distances. The observations on minimum comfortable speed differential on two lane highways suggests a psychological factor tending to cause the grouping or entraining of vehicles on the open highway.

178. STREAMLINING THE HIGHWAYS FOR SAFETY. (Popular Mechanics, July 1939)

No longer does America have to wrinkle its brow over the complexities of modern traffic. Slowly but surely, the traffic engineer has been getting the problem in hand.

From his years of research amid motor-car exhaust fumes and policemen's whistles and his careful study of thousands of highway-accident reports, the specialist in this field sees faulty road design as the tap-root of our accident evils. If unlimited funds were available for road building, he is confident ninety-eight per cent of the opportunities for accidents could be designed out of our streets and highways.

Functionally, at least, a major portion of our roadways belong to the horse-and-buggy era. In other words, motorcars capable of speeds up to eighty and ninety miles an hour are now being operated on roads that were designed to carry light traffic at maximum speeds of between thirty and thirty-five miles per hour. And to complicate matters, a high percentage of the country's forty million drivers have only twenty-five mile an hour capabilities.

Streamlining the roadways to meet the exacting requirements of present-day trucks, buses and motor cars has been advocated for several years by Dr. Miller McClintock, head of the traffic bureau at Yale.

The road designed by the Yale traffic expert which makes it difficult for a motorist to go wrong when faced with some emergency thinking is the "limited way." It calls for a separation of traffic streams by a center mall, ten to thirty feet in width, creating one-way traffic on double roadways and precluding head-on smashes and side-swipes. Intersectional jams and crashes are erased by means of grade separations, over and under passes, and clover-leaf detours for making turns.

The limited way is either raised above the level of the ground or below it, which disposes of the pedestrian problem. Provision is made for accelerating and decelerating lanes for fast and slow traffic leading from the main highway.

The highway engineer cannot endow the motorist with judgment, he adds,but can provide sufficient clear vision for the exercise of good judgment. Road safety depends fundamentally upon the ability to see, particularly when traffic moves as it now does over rural highways.

If a highway is built so impatient or careless drivers are encouraged to remain behind slow-moving vehicles until they see a sufficient length of highway clear of opposing traffic for passing, he says, head-on collisions and other accidents, will be fewer in number than if the road is constructed with inadequate sight distances.

When you go fast you need more space than when you go slow, so highways must be wide enough to allow a clearance in keeping with road speeds. Shoulders wide enough for stopping, consistently smooth, non-skid surfaces and the elimination of deep side ditches are safety measures that are now being practised universally.

Approximately sixty-seven and one-half per cent of all motor-vehicle deaths in urban area and thirty-five per cent of those on rural roads are pedestrian fatalities. To cope with this phase of the safety problem, tunnels are being built under or over heavily traveled roads near shcools, large industrial plants, public beaches, playgrounds, and business districts.

NEWS ABOUT THE ENGINEERING PROFESSION

IMPLEMENTING TRAFFIC SAFETY. "The traffic muddle in which New York now finds itself is due to several causes, the first being the tremendous increase in motor traffic; but almost as important has been the failure to seriously consider propositions which had they been heeded would have forestalled a large part of the present difficulties," said WILLIAM PHELPS ENO on March 8, 1923.

What is needed is a comprehensive Exhibition of traffic control devices in connection with a meeting of traffic engineers and experts whose sole purpose is to understand, praise and criticize the exhibits.

Meanwhile it would seem that the best results in diminished traffic accidents will accrue from the direct study of motor vehicles in motion and parked at each location, a profounder knowledge of the modern implements which control and facilitate their flow and use, and the wholehearted unprejudiced application of these implements, in place of none or meager or home-spun devices, so that today's traffic may be better controlled and facilitated and the manufacturers of the public safety industry may be practically encouraged to bloom forth with ever better implements to strengthen the arm and reputation of traffic engineers. (American City, July 1939)

BRUCE D. GREENSHIELDS. Professor Bruce D. Greenshields, Chairman of the Library Committee is conducting several traffic engineering research projects in Ohio this summer, in cooperation with Harry Neal, Traffic Engineer, State Highway Department, Columbus, Ohio.

Proper use of highway marks and the development of approach speeds at intersections will be two of the many major interests of his summer research.

REVISIONS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. A pamphlet of Revisions of the Manual on Uniform Traffic Control Devices has been made available for general distribution by the U. S. Bureau of Public Roads. The revisions are those recently approved by the Joint Committee on Uniform Traffic Control Devices representing the American Association of State Highway Officials and the National Conference on Street and Highway Safety. When approved by the Secretary of Agriculture they will become a part of the official standard for Federal-aid highways, in accofdance with Federal-aid regulations.

Among the more important changes in the Manual are the following:

Reflecting buttons shall be placed in the symbols or messages instead of in the borders of the signs. White buttons or flashing red self-illuminating shall be used in the STOP sign.

New signs and markings are prescribed for "No-passing" zones.

The design and application of speed limit signs are simplified, for better adaptation to current speed zoning practices.

The pavement marking for railroad grade crossings

is made more distictive.

More adequate provision is made for the protection and convenience of pedestrians at signalized intersections.

ITE MEMBERS ON JOINT COMMITTEE. The following Institute members served on the Joint Committee on Signs,Signals,and Markings:

John S. Beakey	Walter F. Rosenwald
W. Graham Cole	Clarence P. Taylor
Harold F. Hammond	Arnold H. Vey
William B. Powell	Sidney J. Williams

WILBUR S. SMITH. Wilbur S. Smith, Traffic Engineer, South Carolina State Highway Department, conducted an inspection tour of the New Jersey Highway System.

Mr. Smith was particularly interested in the road widening operations and the installation of medial strips.

MAXWELL N. HALSEY AND THEODORE M. MATSON. Max Halsey and Ted Matson are making an extended trip throughout the United States interviewing prospective fellows for next years attendants at the Bureau for Street Traffic Research. They estimate each will have traveled some fifteen or twenty thousand miles before completing the personal interviews.

ROBERT A. MITCHELL. Robert A. Mitchell has accepted the position of Banquet Committee Chairman for the ANNUAL CONVENTION. One of Bob's many jobs is to find a speaker for the breakfast.

ANNUAL CONVENTION. Let us urge you to plan to attend the ANNUAL CONVENTION of the Institute of Traffic Engineers. It will be held in Atlantic City, New Jersey, October 14 to 17-inclusive.

Send in your reservations for rooms now and avoid any last minute confusion.

SALE OF BACK ISSUES OF PROCEEDINGS. There are still a few, copies of the 1934, 1935, 1936, and 1937 issues of the ANNUAL PROCEEDINGS Of the Institute left. They are going fast--send in your order at once.

BISCUIT BANTER BREAKFAST. The Committee planning the Biscuit Banter Breakfast to be held in Atlantic City on Monday, October 16, is in a great dither. All sorts of wild ideas, plans, suggestions and what-not are being "bantered" back and forth across the country. Latest telegraphic reports from the hinterland are that its going to be a fish breakfast run by the boys of the F. and F. Club. Coronation of Grand Efer O'Meara is expected to take place at that time unless he abdicates sooner and leaves his throne to the popular young Duke of Muskellenge

One of our snooping reporters claims that all who attend the breakfast must bring with them some evidence of their skill as fisherman. Admissible items include the following: tuna rods, licenses, opened salmon cans, live (or dead) bait, waders, minnow pails, live boxes, landing nets, marlin gaffs, marlin spikes, outboard motors, water skis, and items of similar nature. Power boats over 32 feet in length and fish stories will not be accepted.

Those who are forced to "hock" their equipment to get to the convention will be outfitted without charge by the commissary which is being established especially for this occasion.

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THE OBJECTIVES OF THE INSTITUTE

The objects of the Institute shall be the advancement of the art and science of traffic engineering, the fostering of traffic engineering education, the stimulation of original research in traffic engineering, the professional improvement of its members, the encouragement of intercourse between men with mutual interests in traffic engineering, and the establishment of a central point of reference and union for its members. (Article I, Section 4 of the Constitution of the INSTITUTE OF TRAFFIC ENGINEERING).

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